UNCLASSIFIED FACSIMILE COVER SHEET

OAK RIDGE NATIONAL LABORATORY
MARTIN MARIETTA ENERGY SYSTEMS, INC.

LOCATION:	**Oak Ridge, TN**	**FAX:**	**(615) 576-9496**
ADDRESS:	**105 Mitchell Rd., MS 6496**	**VERIFY:**	**(615) 576-3886**

FROM:	**C. R. Richmond**	**Telephone:**	**(615) 576-3886**
TO:	**Harvey Scott**	**Telephone:**	**(301) ~~858~~ 903-4767**

COMMENTS: **Budget numbers are coming separately (probably tomorrow).**

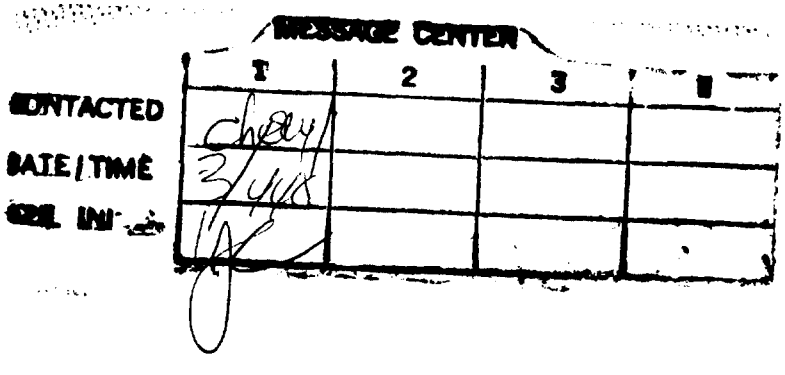
SEND TO FAX #:
VERIFY:

This document consists of 7 pages excluding cover sheet.

Date: **2/3/92**

Time: **4:00 pm**

Operator: **bth**



This work provides technical and scientific coordination for Technical Assistance to Spain (Project Indalo) in accordance with an assignment from the Department of Energy's (DOE) Oak Ridge Operations (Lenhard to Postma, December 4, 1980) following guidance from DOE Headquarters. DOE guidance is for Oak Ridge National Laboratory (ORNL) to provide more direction, coherence, and continuity to the U.S. activities associated with this project and to be of greater assistance to the Government of Spain. Program responsibility was assigned to ORNL whereas DOE Headquarters maintain responsibility for policy issues, interaction with other agencies of the Executive Branch, including the U.S. Embassy in Madrid, and for government to government relations. For many years the major contact in Spain was Dr. Emilio Iranzo at the Centro de Investigaciones Energeticas Medioambientales y Technologicas (CIEMAT), formerly JEN, in Madrid. Dr. Iranzo has retired but is a consultant to the project. Dr. Jose Gutierrez Lopez is currently the prime contact.

The requested funding will cover all procurements for the Technical Assistance to Spain program and all work performed in the U.S. for Technical Assistance for Spain [e.g., ORNL, Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), the DOE's Environmental Measurements Laboratory (EML), and the National Institute of Standards and Technology (NIST). ORNL, with assistance from others, will:

- recommend to DOE programmatic scope and required resources
- assist DOE personnel in maintaining their programmatic objectives and maintaining continuity of technical assessments;
- maintain previously established rapport and logistics with Spanish personnel; provide CIEMAT with advice on program direction, equipment needs and maintenance, and data interpretation;
- obtain, install and monitor equipment supplied to the CIEMAT;
- when requested, prepare jointly with Spain research proposals and program planning documents and provide reports on supporting project management activities.
- assist CIEMAT personnel in the preparation of technical presentations, publications.

b. Publications

J. S. Drury, et al., 1983. "Radioactivity in Food Crops," ORNL-5963, 321 pps. Supplement to above, 1983. 145 pps., (Data sorted by Geographical Area and Nuclide).

E. Iranzo and S. Salvador, 1983. "Doses From Potential Inhalation by People Living Near Plutonium Contaminated Areas," (translated from The Spanish Nuclear Energy Board), ORNL-tr-5060.

J. W. Holleman, et al., 1987. "Worldwide Fallout of Plutonium From Nuclear Weapons Tests," ORNL-63 15.

E. Iranzo, S. Salvador and C. E. Iranzo, 1987. "Air Concentrations of ^{239}Pu and ^{240}Pu and Potential Radiation Doses to People Living Near Pu-Contaminated Areas in Palomares, Spain," Health Phys. 52(4), 453-461.

E. Iranzo and C. R. Richmond, 1987. "Plutonium Contamination Twenty Years After the Nuclear Weapons Accident in Spain." In, Proceedings of the 8th International Congress of Radiation Research. Eds., E. M. Fielden, et al. Taylor and Francis. p. 58.

c. Purpose

The purpose of the proposed work is to provide technical and scientific coordination for this activity as requested by DOE Headquarters in December 1980. While funded in the past ORNL has provided direction, coherence, and integration to the U.S. activities associated with this project and for continuity of U.S. assistance to the Government of Spain. DOE Headquarters retains responsibility for policy issues, interaction with other agencies of the Executive Branch, including the U.S. Embassy in Madrid, and for government to government relations.

There have been many interactions, both formal and informal, among contractor staff in DOE laboratories and DOE Headquarters personnel since the nuclear weapons accident at Palomares in 1966. The proposed work is designed to coordinate the U.S. supporting activities for the Technical Assistance to Spain program and assist DOE Headquarters in planning and implementing U.S. activities.

d. Background

The incident at Palomares, Spain, in 1966, which resulted from an accident involving nuclear weapons, created considerable international attention, as it involved the release of plutonium from U.S. nuclear weapons into the environment of a foreign country.

At 10:30 a.m. (local time), on January 17, 1966, a USAF B-52 bomber and a USAF KC-135 tanker collided during a refueling operation over the southeastern coast of Spain. Both aircraft were destroyed in the air. Of the four nuclear weapons aboard, one was recovered intact from the Mediterranean Sea about 5 miles offshore 80 days after the collision and another was recovered intact from the dry Almanzora riverbed just east of Palomares. The primary parachutes did not open for the other two and each weapon underwent high explosive detonation upon impact.

d. Background (cont'd.)

One weapon landed approximately one mile west of the village (Impact Point No. 2) and the second landed at the eastern edge of Palomares (Impact Point No. 3). Few people were working in the fields, as most villagers were celebrating the festival of Saint Anthony, the patron saint of Palomares. However, Pedro Alarcon de la Torre and two of his nieces were thrown to the ground by the high explosive detonation of the weapon at Impact Point No. 3. This explosion broke the windows and cracked the walls of his home. The population of Palomares at the time was estimated to be about 1500.

The impact, high explosive detonation, and burning of weapon number two (Area 2) produced a plutonium-bearing dust cloud which was blown by a 30-knot westerly wind across cultivated fields and the northern edge of the village. The cockpits of both aircraft landed within about one quarter mile of Impact Point No. 2. The cloud from impact point No. 2 traveled down a small valley into a northeasterly direction and then past the northern edge of the village. The end of the valley nearest the impact point had once been used for dry farming but, because of inadequate rainfall, had not been cultivated for many years. The portion of the valley nearest the village was irrigated and under cultivation at the time of the accident. The plutonium-bearing clouds produced by the weapon that fell in the eastern edge of the village (Impact Point No. 3) traveled away from Palomares but across the prime cultivated

(irrigated) fields used for growing tomatoes, beans, and alfalfa. Several tomato crops are produced each year; and at the time of the accident, the last tomato crop of the season was ready for harvest.

Following the accident, a survey of the surface distribution of plutonium was conducted to determine the extent of ground contamination. The isopleths describing the surface plutonium contamination within weeks of the accident were used as the basis for the cleanup operation. About 226 hectares (558 acres) were contaminated with plutonium. Resurveys of some areas around Palomares were started in 1982. Major resurveys around Area 2 were slowed down or terminated in the late 1980's when DOE interrupted program funding.

e. Approach

The approach to be used will be as follows:

- ORNL staff will advise and assist DOE Headquarters in technical matters associated with this work; for example, evaluation of equipment needs, including upgrading and repair, will be performed by ORNL and other personnel and provided to DOE Headquarters staff. These evaluations will be based on past activities and future needs, especially in the area of environmental samples analyses for plutonium and americium. Operating funds must be used for equipment to be used in Spain.

- ORNL personnel will assist in the preparation of program planning documents, including cost estimates developed with CIEMAT personnel in Spain. These planning documents will, in turn, be made available to DOE Headquarters personnel.

- ORNL personnel will assist as necessary in the preparation of research proposals submitted by CIEMAT personnel.

- Major emphasis for the work in Palomares will be directed towards establishing the inventory of residual contamination in Area 2.

Approach (cont'd.)

ORNL personnel will recommend to DOE the required resources and programmatic requirements for this activity. This will be done on both an *ad hoc* and annual basis. The annual report will be a summary of the supporting project management activities and will also contain, as needed, recommendations related to program scope and required resources.

ORNL staff will obtain English translations of key articles and papers related to the Palomares incident.

All DOE-supported work related to this activity will be coordinated by ORNL. Subcontracts will be established for work required from other organizations.

- A major goal of Project Indalo is to prepare technical publications for the open literature. This must be done carefully and with joint approval by the U.S. and Spanish authorities. Although some aspects of Project Indalo were published in the earlier years following 1966, no major comprehensive publication appeared until one appeared in *Health Physics* in 1987.

- Computer codes for radiation dose assessments are provided to the CIEMAT staff. ORNL staff will work with CIEMAT personnel to develop the required assessment techniques at the CIEMAT.

- ORNL and other personnel will strive to maintain previously established rapport and logistics with Spanish personnel. This is very important and has been difficult for the past several years because of unanticipated funding interruptions by DOE. The strong interpersonal relationships that have developed since 1966 help to assure successful continued interactions between the U.S. and Spain as regards this project.

- ORNL personnel will use a review group consisting of three to five expert individuals to provide additional counsel and wisdom for Project Indalo activities. This group met periodically (approximately biannually) to review progress and to be briefed on future plans. These were in 1981, 1983, and 1985. We encourage CIEMAT personnel to visit the United States for programmatic discussions with U.S. program participants and the advisory group. These

meetings should be reinstituted at one- to two-year intervals. No meetings were held since 1885 because of the lack of funds.

f. Technical Progress

Activities were greatly reduced during FY 1987 and FY 1988 for this activity because funding was severely reduced. In addition, no support was provided for the past several years. Also, direct funding from DOE to Spain was interrupted for a period of several years during which little information was provided to the U.S. by Spain. We were able to meet with Dr. Iranzo and DOE personnel (ESH and DP) in November 1988 to discuss the funding situation for Spain and the future of the program. As a result of that meeting, some money was provided to the CIEMAT and a change of program responsibility within DOE was made.

We also continued programmatic discussions with Dr. Iranzo on Americium excretion models and estimates of radionuclide inventory at Palomares. A model for Am excretion has been developed and will appear in the March 1992 issue of *Health Physics*.

f. Technical Progress (cont'd.)

We presented data from Palomares at the 8th International Radiation Research Congress held in Edinburgh, Scotland, in July 1987, and at the Second Conference on Radiation Protection and Dosimetry held in Orlando, Florida, October 31 through November 3, 1988. The latter represents the third major presentation of data from Palomares at a large technical meeting in the past several years.

We provided DOE Headquarters with information and answers to questions concerning Project Indalo. The most difficult was a best estimate analysis of the residual Pu at Palomares. There have been numerous changes in DOE Headquarters staff responsible for the program. We have provided documents and information on many occasions to DOE staff during the past several years when the program with Spain was inactive.

g. Future Accomplishments

We plan to purchase and install replacement components of the meteorological station at Palomares during FY 1992 if funds are made available. This upgrade is necessary because equipment now

used at Palomares is becoming more difficult to maintain and keep operational. The equipment is used to measure wind speed, direction, and temperature. Estimated costs for the meteorological upgrade are about 15 thousand U.S. dollars. We previously sent particle sizing equipment to Spain to be incorporated into the high volume samples currently used to measure air concentrations of plutonium at Palomares.

During FY 1989 and FY 1990 we had planned to continue to assist the CIEMAT personnel in establishing the inventory of residual plutonium in Area 2 so that decisions can be made concerning possible remediation. This work needs to be resumed as a high priority effort. We will also be involved in providing assistance to the CIEMAT for interpreting the urinary excretion data for americium-241.

The actual amount of support provided to the CIEMAT personnel for the remainder of this fiscal year and the two subsequent years covered by this proposal will be determined by the funding level.

During FY 1992 we plan to hold a meeting of the advisory group CIEMAT personnel. The last meeting of the advisory group was held in October 1985. We hope to be able to provide DOE with a critical assessment of the current status of the program in progress at the CIEMAT and its future requirements in terms of support and resources.

We will encourage publication in the open literature of data obtained by the CIEMAT staff. If requested, we will provide assistance to CIEMAT in preparing documents.

h. Relationship to Other Projects

There are numerous activities currently under way at ORNL in the area of radionuclide movement, radiation dosimetry, technical information data bases, and health risk assessments that have proved useful as regards our filling commitments to this project. These activities are conducted primarily in our Environmental Sciences and the Health and Safety Research divisions. Information obtained from this project has been useful to DOE in establishing a position on proposed standards for transuranium elements in the environment.

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ADDRESS: 105 Mitchell Rd., MS 6496 **VERIFY:** (615) 576-3886

FROM: C. R. Richmond **Telephone:** (615) 576-3886

TO: Harvey Scott **Telephone:** FTS 233-5725

SEND TO FAX #: FTS 233-3445
VERIFY:

This document consists of 0 pages excluding cover sheet.

Date: 2/5/92

Time: 9:00 am

Operator: bth

DOE Form 5120.2 (Page 1)
(12-87)

U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS

FIELD WORK PROPOSAL

PROGRAM: HA - ENVIRONMENT, SAFETY AND HEALTH

1. WORK PROPOSAL NO.	2. REVISION NO.	3. DATE PREPARED	
EHHA057	0	04-15-92	05

4. WORK PROPOSAL TITLE: INDALO-Technical Support

5. BUDGET AND REPORTING CODE: HA 01 18 00 0

6. WORK PROPOSAL TERM: Begin: 6/1/92 End: OPEN

PATENT STATUS
This proposal is being transmitted in advance of patent review for evaluation purposes only. No further dissemination or publication shall be made without prior approval of the Assistant General Counsel for Patents, DOE.

7. Is This Work Proposal Included in the Institutional Plan? ☐ Yes ☒ No

8. HEADQUARTERS/OPERATIONS OFFICE PROGRAM MANAGER: NAME:(Last, First, MI.) (FTS Number)

11. HEADQUARTERS ORGANIZATION: ENVIRONMENT, SAFETY AND HEALTH

14. DOE ORGANIZATION CODE: EH

9. OPERATIONS OFFICE WORK PROPOSAL REVIEWER:

12. OPERATIONS OFFICE: Oak Ridge Operations

15. DOE ORGANIZATION CODE: ON

10. CONTRACTOR WORK PROPOSAL PRINCIPAL INVESTIGATOR(S)/MANAGER: C. R. Richmond

13. CONTRACTOR NAME: Martin Marietta Energy Systems, Inc.
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831

16. DOE CONTRACTOR CODE: 41

17. WORK PROPOSAL DESCRIPTION (Approach, anticipated benefits in 200 words or less)

18. CONTRACTOR WORK PROPOSAL MANAGER: (Name and FTS No.)
Signature: Date

19. OPERATIONS OFFICE REVIEW OFFICIAL
(Signature) (Date)

20. DETAIL ATTACHMENTS: *(See instructions for page 3)*

☐ a. Facility Requirements ☐ b. Publications ☐ c. Purpose ☐ d. Background ☐ e. Approach ☐ f. Technical progress ☐ g. Future accomplishments ☐ h. Relationships to other projects ☐ i. Environmental assessment ☐ j. Explanation of Milestones ☐ k. Other (specify):

DOE Form 5120.2 (Page 2)
(12-87)

WORK PROPOSAL REQUIREMENTS FOR OPERATING/EQUIPMENT OBLIGATIONS AND COSTS

PROGRAM: HA - ENVIRONMENT, SAFETY AND HEALTH

CONTRACTOR NAME	WORK PROPOSAL TITLE:		
MARTIN MARIETTA ENERGY SYSTEMS, INC.	INDALO-Technical Support		
	WORK PROPOSAL NO. EHHA057	REVISION NO. 0	DATE PREPARED 04-15-92

21. STAFFING *(in staff years)*	PRIOR YEARS	FY 1992	FY 1993 REQUEST	FY 1993 AUTHOR.	FY 1994	FY 19	TOTAL TO COMPLETE
a. SCIENTIFIC		.1	.1		.1		
b. OTHER DIRECT-ORNL		–	–		–		
c. OTHER DIRECT-INTER PLANT		–	–		–		
d. TOTAL DIRECT		.1	.1		.1		
22. OPERATING EXPENSE *(in Thousands)*							
a. TOTAL OBLIGATIONS		59	43		44		
COSTS:							
1) COST CENTERS		9	10		11		
2) MATERIALS AND SERVICES		10	10		10		
3) SUBCONTRACTS AND CONSULTANTS		12	12		12		
4) INDIRECT COSTS		21	11		11		
b. TOTAL COSTS		52	43		44		
23. EQUIPMENT *(in Thousands)*							
a. EQUIPMENT OBLIGATIONS		50	0		0		
b. EQUIPMENT COSTS		50	0		0		

24. MILESTONE SCHEDULE (TASKS:)	DOLLARS *(in Thousands)*		SCHEDULE (DATE)	
	PROPOSED	AUTHORIZED	PROPOSED	AUTHORIZED

25. REPORTING REQUIREMENTS (DESCRIPTION:)

WORK PROPOSAL JUSTIFICATION REQUIREMENTS
OBLIGATIONS AND COSTS

PROGRAM: HA - ENVIRONMENT, SAFETY AND HEALTH

CONTRACTOR NAME	WORK PROPOSAL TITLE:		
MARTIN MARIETTA ENERGY SYSTEMS, INC.	INDALO-Technical Support		
	WORK PROPOSAL NO.	REVISION NO.	DATE PREPARED
	EHHA057	0	04-15-92

20. DETAIL ATTACHMENT CONTINUED:

K. (1) OBLIGATIONS FOR OPERATING EXPENSES - Budgeting Authority (BA)

	Obligation Estimate		
	FY 1992	FY 1993	FY 1994
Cost (B/O) Estimates (from Item 22.b.) Total costs, Page 2	52	43	44
Less: Uncosted Balance at 9/30	0	7	7
Plus: Commitments for Continued Operations	1	1	1
Outstanding Commitment Bal. 10/8	6	6	6
TOTAL OBLIGATIONS - CHANGE	59	43	44

(2) None.